DOCUMENT RESUME

ED 302 986 EC 211 873

AUTHOR Michael, Martha G.; Paul, Peter V.
TITLE Early Intervention for Infants with Deaf-Blindness.
INSTITUTION Ohio State Univ., Columbus. Dept. of Educational Services and Research.
PUB DATE 88
NOTE 53p.; A part of the Helen Keller National Center--Technical Assistance Center Project.
PUB TYPE Information Analyses (070)

EDRS PRICE MF01/PC03 Plus Postage.
DESCRIPTORS Auditory Training; Blindness; Communication Skills; *Deaf Blind; *Definitions; Government Role; *Handicap Identification; Infants; *Intervention; Language Acquisition; Models; Parent Participation; Preservice Teacher Education; Professional Education; *Sensory Training; Theories; Visual Learning
IDENTIFIERS *Early Intervention

ABSTRACT

The paper examines issues in early intervention with deaf blind infants. Considered are the effects of definitions of deaf-blindness on service provision and on the training of preservice students in this area. Appropriate programs entail intervention methods that address the usage of residual vision and audition as well as the development of other senses. The development of language and communication skills is critical. The range of interpretations of the federal government's definition of deaf blindness has caused a pervasive problem in programming, preservice training, and funding. A variety of alternative definitions are discussed. Early intervention is also defined and the importance of early identification stressed. Two major intervention models, the developmental model and the functional model, are explained. Early intervention for this population is discussed in terms of visual assessment, visual training, auditory assessment, auditory training, receptive and expressive communication assessment, and functional communication training. Recommendations include adequate assistive programming in sense utilization, development of appropriate preservice training, research on best teaching methods for this population, and involvement of parents and other family members as early in the intervention process as possible. A list of 126 references is included. (DB)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED302986

Early Intervention for Infants with Deaf-Blindness

Martha G. Michael

Helen Keller National Center--

Technical Assistance Center Project

Ohio State University

Peter V. Paul

Department of Educational Services and Research

Ohio State University

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

✓ This document has been reproduced as received from the person or organization originating it.

Minor changes have been made to improve reproduction quality.

• Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY

Peter V. Paul

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

Address for correspondence:

Peter V. Paul, Ph.D.

Assistant Professor

The Ohio State University

Educational Services and Research

356 Arps Hall

1945 N. High Street

Columbus, OH 43210

Running Head: EARLY INTERVENTION FOR INFANTS WITH DEAF-BLINDNESS

EC 211873

Abstract

There are few individuals labeled deaf-blind who are, in fact, totally deaf and blind. Most of these individuals have residual sight and hearing, but may not receive adequate early training in using these senses effectively. Research in this area is limited. There is some available research, however, in either functional vision training or functional auditory training, but not in the functional training of both senses simultaneously. As discussed in this paper, effective sensory training entails the use of consistent contingent reinforcement methods in natural social contexts to train infants to use their sight and hearing for mobility and communication. It is argued that integrated sensory training is necessary to increase dual sensory-impaired infants' awareness and connection with the world, and help them to become independent adults. In addition, it is important for preservice and inservice teachers of multihandicapped and severely handicapped infants to be aware of effective programming components that satisfy students' needs.

Early Intervention for Infants with Deaf-Blindness

In recent years, educators and researchers have increased their attention to early childhood and early intervention programs for infants with severe disabilities (Beckwith, 1976; Bricker, 1982; Bickman & Weatherford, 1986; Ramey ,Trohanis, & Hostler, 1982; Swan, 1981; Zigler & Berman, 1983). This has stimulated more in-depth investigations of early intervention programs for infants with deaf-blindness (Clark & Morgan, 1983; Freeman, 1985; McInnes & Treffrey, 1982). In relation to early intervention and deaf-blindness, several important questions should be addressed. How is deaf-blindness defined? What effects does this definition have on the identification of individuals with deaf-blindness and the establishment of intervention programs? What are the quality components for programming that need to be emphasized for infants with deaf-blindness? How should these components differ from those for infants who have functional vision and hearing but may be considered severely handicapped?

In this paper, we discuss the effects that definitions of deaf-blindness may have on providing services to young children and on the training of preservice students interested in becoming professionals in this area. In our view, the establishment of appropriate programs entails intervention methods that address the usage of residual vision and audition as well as the development of other senses. In addition, it is important to develop language and communication skills. We

present guidelines for teachers, parents, and administrators of programs and offer our perspectives on definition and intervention issues. We argue also that these perspectives should be emphasized in preservice training programs in university settings. In essence, we hope that our paper generates ideas for further research in the area of early intervention for children with deaf-blindness.

Definition

One pervasive problem in programming, preservice training, and funding is the range of interpretations of the federal government's educational definition of deaf-blindness (Baldwin, 1986; Best, 1984; Bullis & Bull, 1986). This issue not only presents difficulties in discussing birth-to-death service delivery across states, but it also affects special education programs, which are mandated by law to serve individuals with deaf-blindness until the age of 22. The number of persons with deaf-blindness has not increased substantially since 1974; however, the characteristics of the population has drastically changed (due to functional interpretations). The need for quality services and qualified personnel in the area of deaf-blindness has been recognized (Barrett, 1987).

The federal definition of deaf-blind (found in Public Law 94-142) used by the Office of Special Education and Rehabilitation Services (OSERS) and used for Title VI-C

funding is as follows (Federal Register, 1973):

> Deaf-blind means concomitant hearing and visual impairment the combination of which causes such severe communication and other developmental and educational problems that they cannot be accommodated in special education programs solely for the hearing handicapped child or the visually handicapped child. (p. 196)

Instead of suggesting a multiplicity of services that are needed to support these individuals, this definition simply indicates what cannot be provided. Presently, programs designed for multihandicapped or severely handicapped students may not be thoroughly equipped to provide specialized instruction for children with dual sensory impairments who may benefit from training, for example, in the use of their residual hearing and vision. The definition of deaf-blindness should be expanded so that a greater number of these individuals in education and rehabilitation programs can receive adequate services (Watson, Barrett, & Brown, 1984).

Helen Keller National Center, for example, has a two-tier approach to defining deaf-blindness. One tier is restrictive, and the other functional. The restrictive aspect of the definition includes visual acuity ratings and specific auditory discrimination scores. The functional definition contains two parts 1) individuals showing poor prognosis and limited ability to use vision and hearing, and 2) individuals

requiring training in the use of assistive devices to improve their hearing and sight.

The Rehabilitation Services Administration (RSA) established a study group to develop a functional description of deaf-blindness designed to encompass the more restrictive aspects of definitions used by various state-agency programs (Ronar & Rice, 1982). The definition has three components. First, it describes individuals who cannot attain maximum independence, and who, even when fitted with best corrective aids, still exhibit severe visual and auditory impairments that constitute deaf-blindness. Next, it describes individuals with auditory and visual dysfunctions that cause them to function as persons with deaf-blindness. Finally, the definition describes individuals with progressive auditory or visual losses that may cause difficulty in achieving maximum independence.

Individuals categorized as having deaf-blindness then can represent any of the following 1) those with moderate to severe auditory and visual impairments with other areas such as communication and/or adjustment difficulties in need of intervention to ensure maximum independence, 2) those with severe to profound auditory and visual losses with or without other disabling conditions who need services to increase independence, 3) those with central-processing problems that result in cortical blindness or functional deafness, and 4)

those with progressive sensory impairments such as Ushers Syndrome (Robbins 1973; Ronar & Rice, 1982). Clearly, the focus of these categories is a person's functionality and eligibility for service (Barrett, 1987).

Twenty-five years ago, only individuals with adventitious deafness and blindness due to spinal meningitis or other diseases were counted as deaf-blind (Barrett, 1987; Nixon, 1974). During the Rubella bulge of 1964-1965, this interpretation was changed to include persons with sensory impairments exhibiting other disabling congenital conditions such as mental retardation. Until recently, only categories 2 and 4 above were definitely considered in the group with deaf-blindness by most states (Ronar & Rice, 1982). More recent functional interpretations have allowed for some states to include persons described in the other two categories, that is, 1 and 3. For example, Ohio, Pennsylvania, and Illinois recently recounted students with dual sensory impairments to include those with functional impairments (Arnold, 1987).

The addition of more inclusive descriptions of deaf-blindness has drastically changed the parameters of the population. Individuals with deaf-blindness are theoretically supposed to be considered an entity under the umbrella of severely handicapped, and are not to be considered multihandicapped (D'Zamko & Hampton, 1985). In practice, however, they are categorized and placed as students with

multihandicaps. Consequently, they may not receive appropriate intervention for their sensory impairments. The specific needs of children with congenital deaf-blindness, of children with later onset of dual sensory impairments, or of children with CNS processing problems resulting in functional deaf-blindness are not likely to be met. For example, it is possible that some of the earlier methods of teaching children with deaf-blindness have been supplanted by more recent ones that resemble methods used for teaching children with other disabilities such as autism and severe mental retardation. Because of this condition, most teachers may not be familiar with functional low-vision and auditory assessments, functional residual visual-training and auditory-training methods, multisensory training methods, coactive learning techniques (Van Dijk, 1971) and alternative modes of communication (e.g., the Tadoma method, sign language).

The Use of Vision and Audition

Education of children with dual sensory impairments should entail a holistic approach to using and enhancing the abilities of the person, and should not focus merely on what the person doesn't have (Robbins, 1973). Approximately 94% of children reported to be deaf-blind (Ouellette, 1984) have either residual hearing or residual sight (Fredericks & Baldwin, 1987). Thus, the teacher and other appropriate team members should assess children's functional needs in relation

to their audition and vision for appropriate educational planning (Barraga & Morris, 1982; Goetz, Utley, Gee, Baldwin, & Sailor, 1981; Langley & Dubose, 1976; Smith & Cote, 1982). This does not mean that methods for teaching children with severe mental retardation or autism should not be used. There is a need, however, for auxiliary training for those students with specialized sensory needs (Griffith, Robinson, & Panagos, 1983; Utley, Duncan, Strain, & Scanlon, 1983).

Few individuals with deaf-blindness in programs for deaf-blind are totally deaf and totally blind in comparison to twenty-five years ago (Best, 1984; Bullis & Bull, 1986; Ouellette, 1984). This fact has significance for discussing early intervention and training in the use of residual vision and residual audition. For individuals with deaf-blindness, both the etiology and onset at which sensory impairment occurs influence the degree of the many effects of the disability (Robbins, 1973; Watson, Barrett, & Brown, 1984). If the onset is before birth, for example, then the needs will be different regarding communication development, and orientation and mobility training because the child has never learned to walk or talk and has had little opportunity for incidental learning.

Effects on Training and Programs

Presently, many children with dual sensory impairments are being served with severe mental retardation as their primary disability. That is, their sensory impairments are not

recognized as primary disabilities (Minnesota Department of Public Welfare, 1982). Thus, these children are placed in programs that lack sufficient supportive and consistent services as well as staff training to meet their needs effectively (Fredericks & Baldwin, 1987).

Deaf-blindness is considered the most disabling condition in education and rehabilitation (Bullis & Bull, 1986; Ronar & Rice, 1982). It is very difficult to develop programs because of the heterogeneity of the population. Even university training is not available to provide preservice students with skills to deal with the multiplicity of programming needs for teaching children with deaf-blindness (Baldwin, 1986; Bullis & Bull, 1986; Covert & Fredericks, 1987; Curtis & Tweedie, 1985; Lockett & Rudolph, 1980; Naimen, Schein, & Stewart, 1973; Nixon, 1974; Smith-Davis, Burke, & Noel, 1984; Stahlecker, Glass, & Machalow, 1985; Vernon, 1972). Preservice training for certification in multihandicaps (MH) or severe handicaps (SH) trainees does not address functional visual or aural assessment and training techniques for all types of children with multisensory impairments. In addition, in those states offering certification for multihandicaps, the requirements are so generic they do not provide skills necessary for dealing effectively with deaf-multihandicapped individuals (Curtis & Tweedie, 1985; D'Zampko & Hampton, 1985).

The definition of the term deaf-blind needs to be interpreted to include all individuals exhibiting sensory

losses that are debilitating, not just those whose primary handicaps are sensory impairments (Griffith, Robinson, & Panagos, 1983; Nixon, 1974; Van Dijk, 1969). Programs should focus on what services are needed instead of what services cannot be provided. In essence, research on deaf-blindness as well as preservice training should consider auditory and visual assessment and training, and other sensory training techniques (e.g., tactile and kinesthetic) as well as c mmunication strategies. The population has changed from a homogeneous one of mostly adventitiously deaf-blind students before 1964 to those individuals today with multihandicaps and sensory impairments both measurable and functional. It is from this standpoint that we discuss early intervention programs for infants with deaf-blindness.

Early Intervention

Early intervention is defined here as any identification, support, or educational services provided for children with disabilities or at-risk for handicaps, age three and under, and their families. Infants are viewed as active developing organisms who are quite capable of discriminating and assimilating information as well as interacting with and adapting to the world around them (Ainsworth, 1973; Bowlby, 1958; Bruner, 1969; Garwood, 1983; Lewis & Rosenblum, 1974; Piaget, 1952; Rheingold, 1969, 1973; Stone, Smith & Murphy, 1974;). The first few years of life create the foundation for all subsequent learning, and significantly influences the child's later life.

The importance of early intervention for children with handicapping conditions has been widely documented (Bronfenbrenner, 1975; Hayden, 1979; McInnes & Treffrey, 1982; Peterson, 1983; Reynolds & Birch, 1977; Rossetti, 1987; Schlesinger, 1983; Soboloff, 1979; Swan, 1981; Van Dijk, 1965, 1968, 1969). There is an increasing number of premature infants who survive and are likely to be multiply severely disabled (Robertson & Finer, 1985). In the case of infants with two or more handicapping conditions, the need for early intervention is greater. The dual senses of vision and audition are dynamically and neurologically linked, and to not address both conditions simultaneously may lead to problems in other domains within the infants (Lehr, 1975; Haring, 1976). For example, children with mental retardation who do not receive programming for their visual and hearing impairments may be then at risk for more severe developmental delays.

Numerous studies indicate that the lack of stimulation to sensory systems is damaging to those systems. Kershman (1981) and Utley, Duncan, Strain, and Scanlon, (1983), for instance, indicate that a lack of early intervention may impede development and possibly cause a regression of acquired sensory skills. Schlesinger (1983) argued that meeting the communicative, psychological, and cognitive needs of infants with deafness reduces the presence of maladapted behaviors. This is true also for infants with visual impairments,

especially if services are provided in the crucial early stages of development (Moore, 1984; O'Brien, 1976). In a study with animals, Fantz (1973) concluded that deprivation of early visual experiences produces an atrophy of the psychological structures of vision and causes permanent blindness. Lenneberg (1967) asserted that the critical period for language acquisition is from birth to two years because of the neurophysical maturational development of auditory nerve fibers. After the age of two years, integration of central processing patterns and auditory stimuli is less likely to occur. It may be possible to generalize these findings to include infants with dual sensory impairments.

As discussed previously, infants with deaf-blindness need early intervention for functional residual vision and auditory training, language and communication development, orientation and mobility instruction, and self-image development to enhance their relationship to the world (Freeman, 1985; Nixon, 1974, 1977; Van Dijk, 1968). Soboloff (1979) states:

> It can no longer be accepted that treatment does not commence until the child is three years of age. The objectives of developmental enrichment programs are to help overcome blockages in the babies' developmental progress and to help parents understand the disabilities and their implications, to help them accept and be responsible for daily therapy, and to face the disability in a positive way. (p. 122)

In reviewing early intervention programs, it is evident that those aimed at the first few years of life are the most effective ones (Bronfenbrenner, 1975; Peterson, 1983; Schachter, 1979). Research has also provided evidence that early special education services can ameliorate later handicapping conditions (Deweerd & Cole, 1976; Hayden, Morris, & Bailey, 1977; Karnes & Tesha, 1975; Lazar, Hubbell, Murray, Bosche, & Boyce, 1972; Moore, 1984; Swan, 1981; Schweinhart & Weihart, 1980). Before examining the various approaches to early intervention programs, it is important to discuss means of identifying infants for such programs.

Identification

The severity and multiplicity of problems associated with deaf-blindness today reflect the advances that medical technology has made in saving newborns at risk. The methods for identifying impairments in infants are case finding, registries, and screening (Ramey & Trohanis; 1982). The three stages of identification are locating suspected infants, screening them, and evaluating their needs. Identification can begin before birth with suspect cases, and be accomplished by individuals who come in contact with at-risk mothers or families of such children. Thus, it is recommended that firm connections be made with persons and programs within the medical community such as obstetricians, neonatologists, pediatricians, and well-care clinics to facilitate identification and obtain necessary pertinent information.

Hearing Impairment. Approximately 7% of all infants in the United States are at risk for hearing impairment (Glow & Swanson, 1985). Most hearing-impaired children are not identified until the age of two years for severe impairments and until about four and one-half years for moderate losses. Only seven states in the country have active statewide neonatal hearing screening and high-risk registries. Eight states have legislative mandates to establish such practices, and nine other states are in the planning stages (Mahoney & Eichwald, 1986).

Visual Impairment. Twenty-six states have statutes requiring physicians to register any children having visual problems with their respective Commission for the Blind. Legally-blind individuals are registered in all 26 states, but only 12 states require the provision of services to blind and visually-impaired children at birth. Ten other states require such services for children at the age of three years (Ramey, & Trohanis, 1982).

Deaf-Blindness. There are only nine states that keep a registry of individuals with deaf-blindness (Desantis & Schein, 1986). In addition, only one site, the Western Pennsylvania School for the Blind, is addressing both sensory impairments with an at-risk registry for infants. There is the intention of developing this project into a statewide endeavor (Clark, 1987). A network with the medical community was established before the project started, and various

agencies are represented on an advisory board. This type of coordinated effort with agencies in the community is a vital element in any early intervention program.

Summary. It seems clear that in order to provide appropriate and crucial intervention services to infants and families, it is vital that identification be made as early as possible. States should be encouraged to appoint or request lead agencies for the 0-2 year-old population, and establish registries that include functional tracking, direction systems, and programming options for children with deaf-blindness and their families. This should enable agencies to assist families in finding and securing appropriate services for their children with deaf-blindness (Watson, Barrett, Brown, 1984).

Intervention Models and Theories

In general, there are three major theories that have influenced the establishment of early intervention programs: mechanistic (Skinner, 1953; Watson, 1913), organismic (Levin, 1942), and social learning (Bandura & Walters, 1963). Owing to the lack of a firm theoretical base for high-risk infants, existing programs may be the result of the accumulation of atheoretical research data (Walker & Crawley, 1983). Nevertheless, two theoretical models are widely used (Bailey, Jens, & Johnson, 1983; Filler, 1983).

The Developmental Model

The developmental model (Piaget, 1952, 1964) is influenced

by the organismic theory (Levin, 1942). This theory emphasizes insight and cognition as driving forces within individuals in their development. Responses are considered meaningless unless they serve to fulfill a goal that originated with the individual (Jones, Garrison, & Morgan, 1985). Based on normal-development sequential stages, emphasis is placed on the whole of an individual's behaviors rather than on isolated acts of behavior. Experiences are viewed as factors that enhance or retard development (Jones, Garrison, & Morgan, 1985). Most curricula for infants with disabilities adhere to the tenets of this model (Bailey, Jens, & Johnson, 1983).

Two approaches, based on this model, are currently used. The developmental milestone approach focuses on activities geared at the developmental stages of the child, disregarding chronological age appropriateness of the activities. Skills must be acquired before activities for the next stage of development are introduced. Identified milestones are derived from instruments such as Bayley Scales of Infant Development (Bayley, 1969) and the Vineland Social Maturity Scale (Doll, 1965). Identified skills represent those that have been observed in normal children (Bailey, Jens, & Johnson, 1983).

The second approach is based on the work of Piaget (1952). It focuses on infants' relations to the external world, rather than on behaviors that should be exhibited at particular ages (Filler, 1983). This approach emphasizes cognition, language, and social development, but provides

limited guidance for content direction in other developmental domains (Bailey, Jens, & Johnson, 1983).

The Functional Model

The functional model reflects a mechanistic theoretical construct. Content is driven by currently or subsequently needed behaviors (functionality) rather than by developmental milestones (Bandura & Walters, 1963; Skinner, 1953; Watson, 1913). Behavior checklists, that is, ecological inventories of environments, are used to determine the behaviors that need to be taught to students (Guess, Horner, Utley, Holvoet, Mason, Tucker, & Warren, 1978). In general, proponents teach skills through the use of operant-conditioning methods and task-analysis techniques.

Comprehensive curricula for infants with disabilities have not been developed because functionality and the critical skills needed for future environments are difficult to determine, and methods for teaching functional skills to infants have not been established (Bailey, Jens, & Johnson, 1983). Of the 15 curricula analyzed by Bailey, Jens, and Johnson (1983), only three used the functional approach, and it was used in conjunction with principles taken from one of the developmental model approaches.

Implications for Research and Training

Only one of the 15 curricula for infants described by Bailey et al. (1983) has been field tested. In addition, there are very little data on the effectiveness of the theoretical approaches for infants. It may be that these

approaches are not mutually exclusive. Despite the use of different strategies and curricula, the outcome may be similar, that is, quality of life and independence. Apparently, principles from several theories can be combined in curriculum and instruction (Baliey, Jens, & Johnson, 1983).

Although there are no empirical data to support the use of one curriculum over another, we feel that a creative approach utilizing aspects of both the functional and the developmental models is appropriate for infants, especially infants with dual sensory impairments. Most important, we recommend the incorporation of auditory and visual training for infants with dual sensory impairments. It has been documented that systematic training in these areas does increase residual sense function (Barraga, 1976; Barraga, Collins, & Hollis, 1982; Barraga & Morris, 1982; Lundervold, Lewin, & Irwin, 1987; Smith & Cote, 1982). This, in turn, may enable infants to develop capabilities (e.g., mobility, communication skills) for achieving independence.

Despite one's theoretical bent, there are several issues to consider in discussing the basic design for early intervention programs (Provence, 1974). They are 1) the evaluation of parenting ability; 2) the establishment of a working partnership with parents and other caregivers; 3) a commitment to the parents (and other family members) as people; 4) the establishment of a prescriptive program at home; 5) the ability to recognize and manage children's

experiences and environments; 6) the ability to mobilize and use resources; 7) flexibility in attitude and practice to meet the specific needs of children; and 8) the development of a network of interdisciplinary colleagues who can provide continuous and coordinated services. Finally, it is crucial to develop an evaluation system for monitoring quality of programming (e.g., interactions, integration, age appropriateness of activities), and of the program itself (e.g., meeting goals, efficacy of parent-program relationship) (Zigler & Berman, 1983).

Early Intervention for Infants with Deaf-Blindness

Clearly, the decision to intervene with infants who have dual sensory impairments should be carefully thought out from beginning to end, from marketing for child find to transition services to school. Theoretically, programming needs to be eclectic, using techniques that emphasize, at least, sensory and motor developments across all settings, and particularly the development of functional communication skills (Fredericks & Baldwin, 1987; Goetz & Gee, 1987). With increased usage of residual vision and hearing, communication and mobility skills of the individuals should improve. Thus, we have chosen to focus most of our attention on these crucial training areas.

Relatively little literature is available concerning the enhancement of <u>both</u> residual vision and hearing functions. There are, however, methods available that focus on the functional use of one sense or the other for persons with

deaf-blindness and other multiple handicaps (Goetz & Gee, 1987; Goetz, Utley, Gee, Baldwin, & Sailor, 1982; Hamre-Nietupski, Nietupski, Sandvig, Sandvig, & Ayres, 1984; Smith & Cote, 1982; Warren, 1977). These methods, however, have been designed to aid classroom teachers. They have not focused on the enhancement of the residual senses for further development of communication, mobility, or self image in infants.

A few curricula for very young children provide activities to stimulate growth in these areas, for example, The Carolina Curricula for Infants at Risk and Insight (Johnson-Martin, Jens, & Attermeier, 1986; Clark & Morgan, 1983). These programs, however, do not provide systematic training for both senses, and are not supported by research on children who are deaf-blind. The purported vision-training and auditory-training components of these models need substantial supplemental information on methods and strategies for training in skill acquisition. Based on the available data, we present some salient aspects of visual and auditory assessment and training for infants with dual sensory impairments that can be incorporated into programming.

Visual Assessment

It is important to use functional vision and visual acuity assessments. Functional vision assessments have been developed both for individuals with only visual impairments and for those with multiple handicaps. These tests assess the

clients' abilities in tracking objects, using visual fields, eye-hand coordination, and other functions that reflect visual development. Some assessments developed for clients with multiple handicaps include the Functional Vision Inventory for Severe and Multiply Handicapped (Langley, 1980), the Low-Functioning Assessment Kit (Rock, Litchfield, Jans, Schultz, Ulrich, Pray, Vedovatti, 1983), and a visual assessment manual (Utley, Goetz, Gee, Baldwin, & Sailor, 1981). Since none of the authors report reliability or validity data for these tools, no comparisons on their applicability and effectiveness can be made (Cress, 1985).

A child who does not respond to conventional testing may be a candidate for several physiological tests that focus on visual acuity. These include the electroretinogram (ERG), a visually evoked response (VER) also known as visually evoked potential (VEP), and the opkinetic nystagmx (OKN). The VER has been used extensively to determine the visual acuity of infants (Baraldi, Ferrari, Fonda, & Penne, 1981; Braddick & Atkinson, 1982) and children with neurological handicaps (Dubowitz, Mushin, Morante, & Placzek, 1983; Mohn & Van Hol-Van Duin, 1983). The ERG yields useful information about the functioning level of the retina (Cress, 1985), and the OKN provides information on the acuity threshold of the subject.

Another test that seems promising for infants up to six months old is the FPL or Forced Preferential Looking Test. An adapted version of the Operant Preferential Looking Test (OPL)

is specifically geared towards infants over the age of six months (Teller, 1979). In several studies, it was found that subjects with multiple disabilities could be tested with the OPL (Duchman & Selenow, 1983; Lennerstrand, Axelsson, & Anderson, 1983; Mayer, Fulton, & Sossen, 1983; Mohn & Van Hol-Van Duin, 1983).

Despite the amount of research on vision assessment, there is a need for adaptations of tools, especially for use with the majority of infants and children who do not always respond. In addition, it may be possible to provide visual training to young children to improve their ability to be assessed (Cress, Johnson, Spellman, Sizemore, & Shores, 1982). For example, by using contingent reinforcement, some children can be trained to fixate visually (Mayer, Fulton, & Sossen, 1983).

To obtain accurate data on the visual functioning level of infants with dual sensory impairments, it is necessary to use a variety of tests over a certain period of time, including methods to train visual attentiveness. The need for low-vision aids (both optical assistive devices and environmental adaptations) should be determined individually as early as possible. Methods for adapting environments, optimum positioning of child, and enhancing optimal vision use should be part of the programming (Courtwright, Mihok, & Jose, 1975; Jose, 1983). It is important to complete the assessment

of the infant's functional vision usage prior to developing a training program.

Visual Training

In our view, a functional vision training program should follow a functional and hierarchical sequence, using activities similar to those outlined, for example, in the manual Look at Me (Smith & Cote, 1982) or in Functional Vision Programming: A Model for Teaching Visual Behaviors in Natural Contexts (Goetz & Gee, 1987). These programs have developed instructional strategies based on a thorough sequential conceptual framework. For each visual skill listed below, a separate instructional strategy package should be implemented for each individual infant when appropriate. Implementation begins after a decision is made on the functional context of skill.

1. Awareness of light (orient to presence of stimulus).
2. Attention to light (fixation either bifoveal or monofoveal.
3. Localization of light source in various areas of the visual field (awareness and attention).
4. Light tracking.
5. Visual tracking.
6. Awareness of presence or absence of light.
7. Attention of presence or absence of light.
8. Localization of objects (scanning).
9. Peripheral vision.

The components above should be systematically taught via prompting methods (see Koegel & Egel, 1979; and Utley, Goetz, Gee, Baldwin, & Sailor, 1981), and continuous loop strategies (see Functional Vision Programming by Goetz & Gee, 1987). The individual is required to perform the targeted visual behavior before going on to the next behavior. Contingent reinforcement is used as well as a pairing of the visual objective to a functional skill that requires the use of the targeted visual skill. For example, a functional skill for infants such as grasping is paired with the visual objective of fixation. Older or more skilled infants are expected to visually locate an article of clothing such as their shoe. Event recording techniques can be used to measure the targeted visual behaviors during the observation periods.

In general, infants with dual sensory impairments progress very slowly. Parents should be taught procedures and strategies for achieving objectives step by step through modeling. They should incorporate the activities on a day-to-day basis with their infants at home. An example of one level of this training is presented below.

Level 1. Awareness of light (orient to presence of stimulus).

Rationale: In training very young children to be aware of light, there may be a need to orient them to the presence of any stimulus, and then pair the preferred stimulus with the stimulus of light. When children become aware of various

stimuli in their environment, this is the first step in their reaction to the outside world.

Objective: The purpose of this level is to build awareness of a sensory stimulus by orienting behaviors towards the stimulus. The reactions of the children should be monitored.

Target Behaviors:

a. Head turn

b. Gaze shift

c. Brief fixation

d. Ability to respond consistently to light stimulus

Auditory Assessment

Traditional methods for testing auditory functioning may not be appropriate for infants with dual sensory impairments (Niswander, 1987). It seems that effective testing programs involve the pairing of visual/tactile and auditory stimuli, and then fading these stimuli so that the level of auditory response can be determined. For infants without efficient vision usage, there seem to be no best testing procedures available that are supported by research. The auditory brainstem response (ABR) and behavior observation audiometric (BOA) methods are recommended for hard-to-test individuals; however, they are not always accurate (Hecox, Gerber, & Mendel, 1983; Jerger, Hayes, & Jordan, 1980; Niswander, 1987; Spradlin, 1985). To achieve maximum and reliable results, the

examiner may need to use several methods of assessment.

Behavioral audiometry has been adapted for use with hard-to-test individuals by including classical and operant conditioning to train responses. For example, visual stimuli may be used to reinforce localization responses (Goetz, Gee, & Sailor, 1985). Adaptations for individuals who are visually impaired may include the use of vibrotactile reinforcement (Spradlin, 1985). There is a great need for more research in this area.

The traditional habilitation methods such as speech reading (lip reading) and the use of signs to supplement auditory input also have limited effects with infants with dual sensory impairments. The most promising methods appear to be multisensory approaches adapted for infants with limited sight. To maximize sensory input, prosthetic devices such as hearing aids and vibrotactile stimulation aids can be used. Finally, training may be most effective if conducted in age-appropriate contexts and using appropriate reinforcement.

Auditory Training

It may be most beneficial if an auditory-training program follows a functional sequence that correlates to what has been observed in normally sighted infants, deviating only in the time of achievement of the various skills. Boothroyd (1982) has outlined seven target behaviors that should be components of a successful auditory-training program. They are as follows:

1. Attend to sounds
2. Attend to differences among sounds
3. Recognize objects and events from the sounds they make
4. Be alerted by sounds
5. Use hearing for the perception of space
6. Use hearing for the perception of speech
7. Use hearing to control the production of speech

This sequence of behaviors can serve as a conceptual framework for the training components of an auditory-training program. An example of one level is presented below.

Level 1. Develop an awareness of sounds (attend without meaning)

Rationale: The initial cognitive level to be achieved is a basic awareness of the presence and dimensions of sound without any necessary recognition of this auditory stimulus.

Objective: To provide very young children with a knowledge of the presence of sound.

Suggested Target Behaviors (Michael, Arnold, & Niswander, 1988, p. 13-14):

a. Eye-widening
b. Eye-blink
c. Startle
d. Stirring or arousal from sleep

<u>Receptive and Expressive Communication Assessment</u>

It is important to assess functional receptive and

expressive communication channels, especially preverbal communication behaviors (Hollis & Carrier, 1978; Seigal-Causey & Guess, 1985; Stremel-Campbell, 1985, 1986). By targeting those skills already acquired by the infants, personnel responsible for designing, programming, and training can obtain information on the communication level of infants with dual sensory impairments. Behaviors viewed as communication, whether intentional, preintentional, conventional, or nonconventional should be observed and recorded (Sternberg, Battle, & Hill, 1980). The level of pragmatics or intent, as well as effectiveness of these communicative behaviors, can be used in developing specific training procedures to foster growth in these areas.

In assessing receptive communication skills, the following questions can be posed, for example: Does the child demand interaction time? Does the child establish and maintain eye contact? How effective is the child at turn taking once interaction is initiated? Does the child turn towards sensory stimuli and reach out? Does the child anticipate the next step in a sequence? Examples of questions used for assessing expressive communication skills may be as follows: Does the child express discomfort after playing with a particular object for a while? Does the child express pleasure doing certain activities, or with certain people as opposed to others? Observing existing expressive behaviors indicates the

infant's level of awareness and receptiveness to interactional encounters (McDonald & Gillette, 1986; Michael, Arnold, & Nisvander, 1988; Siegel-Causey & Downing, 1987).

Functional Communication Training

Certain receptive and expressive skills can be developed in children through systematic and consistent training in natural play or other social contexts. Subsequently, the systematic sensory training may help children to build linkages to the world. Their behavioral communication may lead to gestural and more conventional modes of communication (Michael, Arnold, & Nisvander, 1988; Sternberg, Battle, & Hill, 1980).

Natural contexts and activities that provide the highest degree of communication opportunities should be used with children with dual sensory impairments. Both functional visual and auditory training are especially recommended because these senses connect one to the world most effectively. When sight and hearing are limited, other senses need to be incorporated to support the information being processed via these limited pathways.

Conclusion

Services for infants and children with dual sensory impairments should be designed to fulfill the needs of these individuals, not to satisfy the requirements of particular definitions of deaf-blindness. If needs are not met, then the services are inadequate. Children with dual sensory

impairment should receive specialized services such as alternative modes of communication, functional sensory training, and orientation and mobility. We have emphasized effective programming here, rather than programs, to highlight the necessity of fulfilling specialized needs.

In essence, our major recommendations focus on the addition of functional vision and functional auditory training within a natural communicative context. These important components supply the teacher with necessary testing and teaching methods to help children develop skills with which to gather information from the environment, and build connections with objects and people in their world. Infants and children with dual sensory impairments are found in a variety of program settings. Thus, it is crucial that supplemental information and instruction be available to the direct care providers including family members for the further development of the abilities of the children.

Recommendations

1) There is a need for adequate assistive programming in sense utilization for infants and small children with dual sensory impairments. Current programs should structure time to assess and create programming as part of communication, mobility, and self-development activities.

2) The development of appropriate preservice training is important, not only in the management of auditory and visual impairments, but also in methods of instruction.

3) More research should be conducted to determine the best methods for acquisition of skills and development of the child in relation to goals of self development and independence.

4) There is a need to find methods for involving parents/caregivers/extended family members as early as possible in creating communicative environments that stress the use of residual senses.

References

Ainsworth, M. (1973). The development of infant-mother attachment. In B.M. Caldwell & H.N. Riccuti (Ed.), Review of child development research (Vol. 3), (pp. 1-94). Chicago, IL: University of Chicago Press.

Arnold, K. (1987). Personal communication.

Bailey, D., Jens, K., & Johnson, N. (1983). Curricula for handicapped infants. In S. Garwood and R. Fewell's, Educating handicapped infants: Issues in development and intervention (pp. 387-415). Rockville, MD: Aspen.

Baldwin, V. (1986). Prevalence of students with deaf-blindness. Final Project Report. Washington, DC: Office of Special Education and Rehabilitation, Special Education Programs.

Bandura, A., & Walters, R. (1963). Social learning and personality. New York, NY: Holt, Rinehart, & Winston.

Baraldi, P., Ferrari, B., Fonda, S., & Penne, A. (1981). Vision in the neonate (full term and premature): Preliminary result of the application of some testing methods. Documenta Opthalmologica, 51, 101-112.

Barraga, N. (1976). Utilization of low vision in adults who are severely visually handicapped. The New Outlook for the Blind, 70, 177-181.

Barraga, N., Collins, M., & Hollis, J. (1982). Development of efficiency in visual functioning: Literature analysis. In N. Barraga & J. Morris (Eds.), Program to develop efficiency in visual functioning (pp. 4-12). Louisville, KY: American Printing House for the Blind.

Barraga, N., & Morris, J. (1982). Program to develop efficiency in visual functioning. Louisville, KY: American Printing House for the Blind.

Barrett, S. (1987). Trends and issues in developing community living programs for young adults who are deaf-blind and profoundly handicapped: In response to Lyle T. Romar. In A. Covert & B. Fredericks (Eds.), Transition for persons with deaf-blindness and other profound handicaps (pp. 39-50). Monmouth, OR: Teaching Research Publishing.

Bayley, N. (1969). Bayley scales of infant development. New York, NY: Psychological Corporation.

Beckwith, L. (1976). Caregiver-interaction and the development of the high risk infant. In T. Tjossem's (Ed.), Intervention strategies for high risk infants and young children (pp. 119-139). Baltimore, MD: University Park Press.

Best, C. (1984). The 'new' deaf-blind: Results of a national survey of deaf-blind children in educationally subnormal (severe) and hospital schools. The National Association for Deaf-Blind and Rubella Handicapped, England. [Unpublished manuscript].

Bickman, L., & Weatherford, D. (1986). Evaluating early intervention programs for severely handicapped children and their families. Austin, Texas: Pro-Ed.

Boothroyd, A. (1982). Hearing impairments in young children. Englewood Cliffs, NJ: Prentice-Hall.

Bowlby, J. (1958). The nature of the child's tie to his mother. Internal Journal Psychoanalytics, 39, 350-373.

Braddick, O., & Atkinson, J. (1982). The development of binocular function in infancy. Acta Opthalmologica, (suppl. 157), 27-35.

Bricker, D. (1982). Program planning for at-risk and handicapped infants. In C. Ramey & P. Trohanis (Eds.), Finding and educating high-risk and handicapped infants (pp. 119-136). Austin, TX: Pro-Ed.

Bronfenbrenner, U. (1975). Is early intervention effective? A report on longitudinal evaluation of preschool programs. DHEW Publication No. (OHD) 74-25, (Vol. 2).

Bruner, J. (1969). Process of growth in infancy. In A. Ambrose (Ed.), Stimulation in early infancy (pp. 205-228). New York, NY: Academic Press.

Bullis, M., & Bull, B. (1986). Review of research on adolescents and adults with deaf-blindness. Washington, DC: The Catholic University, National Rehabilitation Center.

Clark, J. (1987). Personal communication.

Clark, T., & Morgan, E. (1983). The INSIGHT curriculum manual. Logan, UT: Hope.

Courtwright, G., Mihok, T., & Jose, R. (1975). Reading stands: A nonoptical aid. Optometric Weekly, 66, 449-451.

Covert, A., & Fredericks, H. (1987). Introduction. In A. Covert and H. Fredericks (Eds.), Transition for persons with deaf-blindness and other profound handicaps: State-of-the-art (pp. 1-3). Monmouth, OR: Teaching Research Publications.

Cress, P. (1985). Visual assessment. In B. Bullis (Ed.), Communication development in young children with deaf-blindness: Literature Review I (pp. 31-59). Monmouth, OR: Teaching Research Publications.

Cress, P., Johnson, J., Spellman, C., Sizemore, A., & Shores, R. (1982). The development of a visual acuity test for persons with severe handicaps. Journal of Special Education Technology, 5, 11-19.

Curtis, W., & Tweedie, D. (1985). Content and process in curriculum planning. In E. Cherow, N. Matkin, & R. Trybus (Eds.), Hearing-impaired children and youth with developmental disabilities (pp. 246-270). Washington, DC: Gallaudet College Press.

Desantis, V., & Schein, J.D. (1986). Blindness statistics (Part 2): Blindness registers in the United States. Journal of Visual Impairment and Blindness, 80, 570-572.

Deweerd, J., & Cole, A. (1976). Handicapped children's early education program. Exceptional Children, 43, 155-157.

Doll, E. (1965). Vineland social maturity scale. Circle Pines, MN: American Guidance Service.

Dubowitz, L., Mushin, J., Morante, A., & Placzek, M. (1983). The maturation of visual acuity in neurologically normal and abnormal infants. Behavioral Brain Research, 10, 39-45.

Duchman, R., & Selenow, A. (1983). Use of forced preferential looking for measurement of visual activity in a population of neurologically impaired children. American Journal of Optometry and Physiological Optics, 60, 817-821.

D'Zamko, M., & Hampton, I. (1985). Personnel preparation for multihandicapped hearing-impaired students: A review of the literature. American Annals of the Deaf, 32, 9-11.

Fantz, R. (1983). Visual perception from birth as shown by pattern selectivity. In L. Stone & H. Smith (Eds.), The competent infant (pp. 314-316). New York, NY: Basic Books.

Federal Register. (1973). 38 (196), Part 121 C.37.

Filler, J. (1983). Service models for handicapped infants. In S. Garwood and R. Fewell (Eds.), Educating handicapped infants: Issues in development and intervention (pp. 132-156). Rockville, MD: Aspen.

Fredericks, H., & Baldwin, V. (1987). Individuals with sensory impairments: Who are they? In L. Goetz, D. Guess, & K. Stremel-Campbell (Eds.), Innovative program design for individuals with dual sensory impairments (pp. 3-15). Baltimore, MD: Brookes.

Freeman, P. (1985). The deaf-blind baby: A program of care. London, England: William Heinemann Medical Books.

Garwood, S. (1983). The role of theory in studying infants behavior. In S. Garwood & R. Fewell (Eds.), Educating handicapped infants (pp. 3-19). Rockville, MD: Aspen Publications.

Glow, D., & Swanson, S. (1985). Early detection of the hearing-impaired newborn: The high-risk registry. Nebraska Medical Journal, 70, 177-179.

Goetz, L., & Gee, K. (1987). Functional vision programming. In L. Goetz, D. Guess, & K. Stremel-Campbell (Eds.), Innovative program design for individuals with dual-sensory impairments (pp. 76-97). Baltimore, MD: Brookes.

Goetz, L., Gee, K., & Sailor, W. (1985). Using a behavior chain interruption strategy to teach communication skills to students with severe disabilities. The Journal of the Association for Persons with Severe Handicaps, 10, 21-30.

Goetz, L., Utley, B., Gee, K., Baldwin, M., & Sailor, W. (1982). Auditory assessment and program manual for severely handicapped deaf-blind students. San Francisco State University: Bay Area severely handicapped deaf-blind project, U.S. Department of Education (300780038).

Griffith, P., Robinson, J., & Panagos, J. (1983). Tactile iconicity: Signs rated for use with deaf-blind children. Journal of the Association for the Severely Handicapped, 8, 26-39.

Hamre-Nietupski, S., Nietupski, J., Sandvig, R., Sandvig, M., & Ayres, B. (1984). Leisure skills instructions with deaf-blind severely handicapped young adults in a community residential setting. The Journal of the Association for Persons with Severe Handicaps, 9, 49-54.

Haring, N. (1976). Infant identification. In M. Thomas (Ed.), Hey, don't forget about me! Education's investment in the severely, profoundly, and multiply handicapped (pp. 16-35). Reston, VA: Council for Exceptional Children.

Hayden, A. (1979). Handicapped children, birth to 3. Exceptional Children, 45, 510-516.

Hayden, A., Morris, K., & Bailey, D. (1977). Effectiveness of early education for handicapped children (Contract No. 300-76-0518). Washington, DC: Bureau of Education for the Handicapped.

Hecox, K., Gerber, S., & Mendel, M. (1983). Development of auditory brainstem responses. In S. Gerber and G. Mencher (Eds.), The development of auditory behavior (pp. 77-90). New York, NY: Groone & Stratton.

Hollis, J., & Carrier, J. (1978). Intervention strategies for non-speech children. In R. Schiefelbusch (Ed.), Language-intervention strategies (pp. 57-100). Baltimore, MD: University Park.

Jerger, J., Hayes, D., & Jordan, C. (1980). Clinical experience with auditory brainstem response audiometry in pediatric assessments. Ear and Hearing, 1, 19-25.

Johnson-Martin, N., Jens, K., & Attermeier, S. (1986). The carolina curriculum for handicapped infants and infants at risk. Baltimore, MD: Brookes.

Jones, R., Garrison, K., & Morgan, R. (1985). The psychology of human development. New York, NY: Harper and Row.

Jose, R. (1983). Understanding low vision. New York, NY: American Foundation for the Blind.

Karnes, M., & Teska, J. (1975). Children's response to intervention programs. In J.J. Gallagher (Ed.), The application of child development research to exceptional children, 43, 155-157.

Kershman, S. (1981). Early childhood education. In A. Blackhurst and W. Berdine (Eds.), An introduction to special education (pp. 54-106). Boston, MA: Little, Brown.

Koegel, R., & Egel, A. (1979). Motivating autistic children. Journal of Abnormal Psychology, 88, 418-426.

Langley, B., & Dubose, R. (1976). Functional vision screening for severely handicapped children. The New Outlook for the Blind, 70, 346-350.

Langley, M. (1980). Functional vision inventory for the multiple and severely handicapped. Chicago, IL: Stoelting.

Lazar, I., Hubbell, V., Murray, H., Bosche, M., & Boyce, J. (1972). Summary Report. The persistence of preschool effects: A long-term follow-up of 14 infant and preschool experiments (Grant No. 18-76-0784). Washington, DC: Administration on Children, Youth and Families.

Lehr, D. (1975). Severe multiple handicaps. In E. Meyer (Ed.), Exceptional children and youth (pp. 453-484). Denver, CO: Love Publishing.

Lennenberg, E. (1967). Biological foundations of language. New York, NY: Wiley.

Lennerstrand, G., Axelsson, A., & Anderson, G. (1983). Visual acuity testing with preferential looking in mental retardation. Acta Opthalmologica, 61, 624-633.

Levin, K. (1942). Field theory and learning. Yearbook, national society for the study of education, 41, 152-187.

Lewis, M., & Rosenblum, L. (1974). The effect of the infant on its caregiver. New York, NY: Wiley.

Locket, T., & Rudolph, J. (1980). Deaf-blind children with maternal rubella: Implications for adult services. American Annals of the Deaf, 125, 1002-1006.

Lundervold, D., Lewin, L., & Irwin, L. (1987). Rehabilitation of visual impairments: A critical review. Critical Psychology Review, 7, 169-185.

Mayer, D., Fulton, A., & Sossen, P. (1983). Preferential looking acuity of pediatric patients with developmental disabilities. Behavioral Brain Research, 10, 189-198.

Mahoney, T., & Eichwald, J. (1986). Model program V: A high-risk register by computerized birth certificate. In E. Swigart (Ed.), Neonatal hearing screening (pp. 223-240). San Diego, CA: College-Hill

McDonald, J., & Gillette, Y. (1986). Communicating with persons with severe handicaps: Roles of parents and professionals. Journal of the Association for Persons with Severe Handicaps, 11, 255-265.

McInnes, J. & Treffrey, J. (1982). Deaf-blind infants and children: A developmental guide. Buffalo, NY: University of Toronto Press.

Michael, M., Arnold, K., & Niswander, P. (1988). A study of the differential effects of providing functional vision and auditory training to very young children who are deaf-blind. Ohio State University, Great Lakes Area Regional Center for Deaf-Blind Education. Grant proposal submitted to Office of Special Education and Rehabilitation Services (OSERS).

Minnesota Department of Public Welfare. (1982). Service recommendations and needs assessment of the deaf-blind population of Minnesota. Deaf Services Division: Department of Public Welfare.

Mohn, G., & Van Hol-Van Duin, J. (1983). Behavioral and electrophysiological measure of visual functions in children with neurological disorders. Behavioral Brain Research, 10, 177-187.

Moore, S. (1984). The need for programs and services for visually handicapped infants. Education of the Visually Handicapped, 16, 48-57

Naimen, D., Schein, J., & Stevart, L. (1973). New vistas for emotionally disturbed deaf children. American Annals of the Deaf, 118, 480-487.

Niswander, P. (1987). Audiometric assessment and management. In L. Goetz, D. Guess, and K. Stremel-Campbell (Eds.), Innovative program design for individuals with dual sensory impairments (pp. 99-127). Baltimore, MD: Brookes.

Nixon, R. (1974). Communication through movement. Tempe: University of Arizona. [Unpublished manuscript].

Nixon, R. (1977). Pre-language sensorimotor stimulation/integration program for the development of cognition and communication. Portland Public Schools, Providence Child Center. [Unpublished Manuscript].

O'Brien, R. (1976). Alive ... aware ... a person. Rockville, MD: Montgomery Public Schools.

Ouellette, S. (1984). Deaf-blind population estimates. In D. Watson, S. Barrett, and R. Brown (Eds.), A model service delivery system for deaf-blind persons (pp. 7-10). Little Rock: University of Arkansas.

Peterson, N. (1983). Early intervention with the handicapped. In E. Meyer (Ed.), Exceptional children (pp. 94-143). Denver, CO: Love Publishing.

Piaget, J. (1952). The origins of intelligence in children. New York, NY: Norton.

Piaget, J. (1964). The psychology of the child (2nd ed.). (H. Weaver, Trans.). New York, NY: Basic Books.

Provence, A. (1974). Early intervention: Experiences in a services-centered research program. In D. Bergman (Ed.), The infant at risk (pp. 25-39). New York, NY: Intercontinental Medical Books.

Ramey, C., & Trohanis, P. (Eds.). (1982). Finding and educating high-risk and handicapped infants. Baltimore, MD: University Park Press.

Ramey, C., Trohanis, P., & Hostler, S. (1982). An introduction. In C. Ramey & P. Trohanis (Eds.), Finding and educating high-risk and handicapped infants (pp. 1-18). Baltimore, MD: University Park Press.

Reynolds, M., & Birch, J. (1977). Teaching exceptional children in all America's schools: A first course for teachers and principals. Reston, VA: Council for Exceptional Children.

Rheingold, H. (1969). The social and socializing infant. In D. Goslin (Ed.), Handbook on socialization theory and research (pp. 779-790). Chicago, IL: Rand McNally.

Rheingold, H. (1973). Independent behavior of the human infant. In A. Pich (Ed.), Minnesota symposium on child psychology (pp. 178-203). Minneapolis, MN: University of Minnesota Press.

Robbins, N. (1973). Curriculum sources and schema for development of communication in young retarded children with auditory-visual impairments and mental ages of 4-24 months. Workshop proceedings, The role of physical and occupational therapy in meeting the needs of the deaf-blind child, March 9-10, 1972. Denver, CO: Mountain Plains Regional Center for Services to Deaf-blind Children.

Robertson, C., & Finer, N. (1985). Term infants with hypoxic-ischemic encephalopathy: Outcome at 3.5 years. Developmental Medicine and Child Neurology, 27, 473-484.

Rock, L., Litchfield, M., Jans, S., Schultz, K., Ulrich, A., Pray, S., & Vedovatti, P. (1983). Low-functioning vision assessment kit. In V. Kennedy (Ed.), Vision and hearing screening of the severely handicapped: A resource guide (pp. 20-27). Phoenix, AZ: Department of Education.

Ronar, V., & Rice, D. (1982). Strategies for serving deaf-blind clients. Hotsprings, AR: Arkansas Research and Training in Vocational Rehabilitation.

Rosetti, L. (1986). High-risk infants: Identification, assessment, and intervention. Boston, MA: Little, Brown.

Utley, B., Goetz, L., Gee, K., Baldwin, M., & Sailor, W. (1981). Vision assessment and program manual for severely handicapped and/or deaf-blind students. San Francisco State University. Bay Area Severely Handicapped Deaf-blind Project, U.S. Department of Education (300780038).

Schachter, F. (1979). Everyday mother talk to toddler: Early intervention. New York, NY: Academic Press.

Schlesinger, H. (1983). Early intervention: The prevention of multiple handicaps. In G. Mencher & S. Gerber (Eds.), The multiply handicapped hearing-impaired child (pp. 83-117). New York, NY: Grune & Stratton.

Schweinhart, L., & Weikart, D. (1980). Young children grow up: The effects of the perry preschool program on youth through age 15. Ypsilanti, MI: High/Scope Educational Research Foundation.

Siegal-Causey, E., & Guess, D. (1985). Early development of prelinguistic communication. In B. Bullis (Ed.), Communication development in young children with deaf-blindness: Literature review (pp. 61-78). Monmouth, OR: Teaching Research Publications.

Siegal-Causey, E., & Downing, J. (1987). Nonsymbolic communication development: Theoretical concepts and educational strategies. In L. Goetz, D. Guess, & K. Stremel-Campbell (Eds.), Innovative program design for individuals with dual-sensory impairments (pp. 15-48). Baltimore, MD: Brookes.

Skinner, B.F. (1953). Science and human behavior. New York, NY: Free Press.

Smith, A., & Cote, K. (1982). Look at me. Philadelphia: The Pennsylvania College of Optometry.

Smith-Davis, J., Burke, P., & Noel, M. (1984). Personnel to educate the handicapped in America: Supply and demand from a programmatic viewpoint. College Park: University of Maryland.

Soboloff, H. (1979). Developmental enrichment programs. Developmental Medicine and Child Neurology, 21, 423.

Spradlin, J. (1985). Auditory evaluation. In B. Bullis (Ed.), Communication development in young children with deaf-blindness: Literature review I (pp. 49-61). Monmouth, OR: Teaching Research Publications.

Stahlecker, I., Glass, L., & Machalow, S. (1984). State-of-the-art: Research priorities in deaf-blindness. San Francisco, CA: Research and Training Center on Deafness and Mental Health.

Sternberg, L., Battle, C., & Hill, J. (1980). Prelanguage communication programming for the severely and profoundly handicapped. Journal of the Association for Persons with Severe Handicaps, 5, 224-233.

Stone, L., Smith, H., & Murphy, L. (Eds.). (1973). The competent infant. New York, NY: Basic Books.

Stremel-Campbell, K. (1985). Development of emergent language. In B. Bullis (Ed.), Communication development in young children with deaf-blindness: Literature review I (pp. 79-99). Monmouth, OR: Teaching Research Publications.

Stremel-Campbell, K. (1986). Development of emergent language. In B. Bullis (Ed.), Communication development in young children with deaf-blindness: Literature review II (pp. 121-153). Monmouth, OR: Teaching Research Publications.

Swan, W. (1981). Efficacy studies in early childhood special education: An overview. Journal of the Division for Early Childhood, 4, 1-4.

Teller, D. (1979). The forced-choice preferential looking procedure: A psychophysical technique for use with human infants. Infants Behavior Development, 2, 135.

Tjossen, T. (1976). Early intervention: Issues and approaches. In T. Tjossen (Ed.), Intervention strategies for high-risk and handicapped children (pp. 3-33). Baltimore, MD: University Park Press.

Trohanis, P., Cox, J., & Meyer, R. (1982). A report on selected demonstration programs for infant intervention. In C. Ranvey & P. Trohanis (Eds.), Finding and educating high risk and handicapped infants (pp. 89-97). Baltimore, MD: University Park.

Utley, B., Duncan, D., Strain, P., & Scanlon, K. (1983). Effects of contingent and noncontingent vision stimulation on visual fixation in multiply handicapped children. The Journal of the Association for Persons with Severe Handicaps, 8, 29-42.

Van Dijk, J. (1965). The first steps of the deaf/blind child toward language. Proceedings of the conference on the deaf/blind, Refsnes, Denmark (pp. 47-50). Boston, MA: Perkins School for the Blind.

Van Dijk, J. (1968). Movement and communication with rubella children. Paper presented at the National Association for Deaf-Blind and Rubella Children, Annual Meeting, St. Michielsgestel, Netherlands.

Van Dijk, J. (1969). Educational approaches to abnormal development: Some aspects of the psychology of the senses in relation to the sensory deprived child. Dallas, TX: South Central Regional Center for Services to Deaf-Blind children. [Unpublished Manuscript].

Vernon, M. (1972). Multiply handicapped deaf children. In E. Trapp and P. Hemelstein (Eds.), Readings on the exceptional child (pp. 379-396). New York, NY: Appleton Century-Crofts.

Walker, J., & Crawley, S. (1983). Conceptual and methodological issues in studying the handicapped infant. In S. Garwood and R. Fewell, Educating handicapped infants (pp. 158-209). Rockville, MD: Aspen.

Warren, D. (1977). Blindness and early childhood development. New York, NY: American Foundation for the Blind.

Watson, D., Barrett, S., & Brown, R. (Eds.). (1984). A model service delivery system for deaf-blind persons. Little Rock, AR: Research and Training Center on Deafness.

Watson, J. (1913). Psychology as the behaviorists view it. Psychology Review, 20, 158-177.

Zigler, E., & Berman, W. (1983). Discerning the future of early childhood interventions. American Psychologist, 38, 894-906.